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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/086,171	02/28/2002	Gary E. Betts	MODE1140-1	2656

25548 7590 05/07/2003

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EXAMINER	
KNAUSS, SCOTT A	
ART UNIT	PAPER NUMBER
2874	

DATE MAILED: 05/07/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/086,171	BETTS, GARY	
	Examiner	Art Unit	
	Scott A Knauss	2874	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____ .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-20* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-20* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☒ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892) ✓
2) ☐ ~~Notice of Draftsperson's Patent Drawing Review (PTO-948)~~
3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) *2* .✓
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ ~~Notice of Informal Patent Application (PTO-152)~~
6) ☐ Other: .

DETAILED ACTION

Information Disclosure Statement

1. The references cited in the information disclosure statement have been considered.

Drawings

2. The application has been filed informal drawings which are acceptable for examination purposes only. Formal drawings will be required when the application is allowed.

Claim Objections

3. Claims 8,12 and 15 are objected to because of the following informalities. Appropriate correction is required.

In claims 8,12 and 15 the limitations "said dielectric layer" (claims 8 and 12) and "said first dielectric layer", "said second dielectric layer" (claim 15) lack proper antecedent basis in the claims. The examiner recommends replacing "layer" with "section".

Claim Rejections - 35 USC § 102

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

5. Claims 1-5,15,16 and 18 are rejected under 35 U.S.C. 102(b) as being anticipated by "Quasi-Matched-Velocity Traveling-Wave-Type Electrodes for Light Modulators and their Analysis" (Sanagi et al), cited in International search report.

Regarding claim 1, Sanagi discloses optical modulators in figs. 4 and 5 with all the limitations set forth in the claims, including:

A substrate

A ridge protruding above the upper surface of the substrate

An optical waveguide formed in the ridge

A dielectric (buffer) layer, having a height that is less than or equal to the height of the ridge.

An electrode formed above the dielectric layer and located adjacent to the ridge

Regarding claim 2, in fig. 4, the height of the dielectric layer is equal to that of the ridge, and a portion of the electrode contacts an upper surface of the ridge.

Regarding claims 3 and 4, in fig. 5, the height of the dielectric layer is less than the height of the ridge, and the electrode includes a lower surface located below an upper surface of the ridge, and furthermore, the ridge includes a sidewall, and a portion of the electrode contacts the side wall of the ridge.

Regarding claim 5, under the heading 3.1 on page 82, Sanagi discloses that a buffer layer having low dielectric constant is placed on a substrate with high dielectric constant to decrease capacitance.

Regarding claim 15, Sanagi discloses an optical modulator in figs. 4 and 5 comprising:

A substrate having an upper surface and a ridge

an optical waveguide formed within the ridge

First and second dielectric sections formed to the left and right of the ridge, each having a height less than or equal to that of the ridge

First and second electrodes formed above the first and second dielectric layers, respectively.

Regarding claim 16, the first and second electrodes are adjacent to the ridge

Regarding claim 18, under the heading 3.1 on page 82, Sanagi discloses that a buffer layer having low dielectric constant is placed on a substrate with high dielectric constant to decrease capacitance, thus the first and second dielectric sections have a dielectric constant less than the substrate.

6. Claims 8-10,12-14,19,20,22 and 24 are rejected under 35 U.S.C. 102(b) as being anticipated by US 5,790,719 (Mitomi et al).

Regarding claim 8, Mitomi discloses an optical modulator in fig. 3 comprising:

A substrate #301 having an upper surface with first and second protruding ridges

An optical waveguide formed with the substrate, having two arms #302 each formed within a ridge

A dielectric section (#303) formed on the upper surface of the substrate between the first and second ridges, and

Electrodes #304,#305 formed above the dielectric section

Regarding claim 9, the substrate is formed of LN (lithium niobate, see col. 7, line 23), and the layer #303 is formed of polyimide or silicon dioxide (lines 5-7), both of which have a lower dielectric constant (lines 5-7).

Regarding claim 10 Mitomi discloses an electrode (#304) adjacent to a first ridge

Regarding claim 12, the first and second ridge extend to a first and second height above the upper surface of the substrate, and the dielectric layer extends to a third height above the substrate which is less than the first and second heights.

Regarding claim 13, it is clear that the that the first and second ridges have equal height from fig. 3.

Regarding claim 14, the first and second ridge comprise parts of a Mach Zehnder intensity modulator (see col. 6, lines 61-62) which would inherently comprise two parallel waveguides (see also figs. 1 and 2)

Regarding claim 19, Mitomi discloses a modulator in fig. 3 comprising:

A substrate having an upper surface, first and second protruding ridges dividing the upper surface into three areas, an optical waveguide having two arms formed within the first and second ridges

First, second and third dielectric sections (#303) formed on the three areas

First #305, second #304 and third #305 electrodes formed above the first, second and third dielectric sections, respectively

Regarding claim 20, each ridge extends to a height above the upper surface of the substrate, and each of the first, second, and third dielectric sections have a height less than that of the ridges.

Regarding claim 22, the substrate is formed of LN (lithium niobate, see col. 7, line 23), and the first, second and third sections #303 are formed of polyimide or silicon dioxide (lines 5-7), both of which have a lower dielectric constant (lines 5-7)

Regarding claim 24, the electrodes are described as being "coplanar waveguide electrodes" (col. 6, lines 63-64), which could be interpreted as being configured as a coplanar waveguide transmission line.

7. Claims 8,10,11,15,17,19,21,23 and 24 are rejected under 35 U.S.C. 102(a) as being anticipated by JP 2001-33740 (Shimozu et al).

Regarding claim 8, Shimozu discloses an optical modulator in figs. 3 and 4 comprising

A substrate #11 having an upper surface with first and second protruding ridges above the upper surface

An optical waveguide formed within the substrate, having first and second arms #13-1,#13-2 formed within the first and second ridges, respectively

A dielectric section #16-1 (see translation, [0012],[0018],[0021] which state that the slot is filled with low dielectric materials, including air), formed between the two ridges.

An electrode #14 formed above a dielectric layer.

Regarding claims 10 and 11, the electrode #14 is formed adjacent to both the first and second ridges.

Regarding claim 15, Shimozu discloses an optical modulator in fig. 14 comprising:

A substrate #11 with a ridge protruding above an upper surface of the substrate which has a waveguide #13-2 formed therein, dividing the upper surface into a first area (to the right of waveguide #13-2) and a second area (to the left of waveguide #13-2)

A first dielectric section #16-1 formed on the first area of the upper surface, having a height equal to the height of the ridge

A second dielectric section #16-3 formed on the second area of the upper surface, having a height equal to the height of the ridge

A first electrode #14 formed above the first dielectric layer, and

A second electrode #15-2 formed above the second dielectric layer

Regarding claim 17, electrode #14 is a signal electrode (see abstract) which can also be considered a drive electrode, and electrode #15-2 is a ground electrode (see abstract)

Regarding claim 19, Shimozu discloses a modulator in figs. 3 and 4 comprising:

A substrate having an upper surface, first and second protruding ridges dividing the upper surface into three areas, an optical waveguide having two arms 13-1,#13-2 formed within the first and second ridges

First, second and third dielectric sections (#16-1,#16-3,#16-2) formed on the three areas

First #14, second #15-2 and third #15-3 electrodes formed above the first, second and third dielectric sections, respectively

Regarding claim 21, it is clear from figures 3 and 4 that each ridge extends to a height above the upper surface of the substrate, and each of the first, second, and third dielectric regions has a height equal to that of the ridges

Regarding claim 23, the abstract states that first electrode #14 is a signal electrode (and can be considered a drive signal electrode), and each of the second and third electrodes is a ground electrode.

Regarding claim 24, Shimozu discloses three electrodes 15-2,15-1 and 14, which are coplanar, and could be considered a coplanar waveguide transmission line, since signals are transmitted between the three coplanar electrodes though waveguides 13.

Claim Rejections - 35 USC § 103

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

9. Claims 6 and 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Sanagi et al.

Regarding claim 6, Sanagi fails to disclose the use of Lithium Niobate (LiNbO3) as the substrate, instead disclosing LiTaO3.

Nevertheless, it is well known in the art to use Lithium Niobate in such modulators because it has a strong electrooptic coefficient that leads to low drive voltages, thus making it highly desirable for optical waveguide modulators. Furthermore, since there is no stated criticality for such a material as a substrate in the

disclosure, it would have been an obvious matter of design choice to one of ordinary skill in the art to substitute known electro-optic substrates such as LiNbO3 in the modulator of Sanagi.

Regarding claim 7, Sanagi discloses the use of a buffer layer having a low dielectric constant, but does not specify SU-8, disclosing instead the use of Silicon Dioxide (see pg. 84, col. 1).

Nevertheless, it is clear from the disclosure of Sanagi that any material having a low dielectric constant could be used as the buffer layer material, and since there is no stated criticality in the disclosure for the use of SU-8, it would have been an obvious design choice to one of ordinary skill in the art to substitute known materials, including SU-8, having a low dielectric constant as the buffer layers of Sanagi.

Conclusion

10. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

US 6,304,685 (Burns) and 6,172,791 (Gill et al) 6,111,682 (Minakata et al) 6,069,729 (Gill et al) 5,280,189 (Shuppert et al) disclose additional electro-optic modulators using ridge waveguides.

11. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Scott A Knauss whose telephone number is (703) 305-5043. The examiner can normally be reached on 9-6 Monday-Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Rodney Bovernick can be reached on (703) 308 - 4819. The fax phone

numbers for the organization where this application or proceeding is assigned are (703) 872-9318 for regular communications and (703) 872-9319 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0530.

Scott Knauss

sak
April 11, 2003

HEMANG SANGHAVI
PRIMARY EXAMINER